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## गेज ग्लास — विशिष्टि

भाग 5 भाप बॉयलरों के लिए फिटिंग में उपयोग  
किए जाने वाले पोर्ट गेज ग्लास

( दूसरा पुनरीक्षण )

## Gauge Glasses — Specification

Part 5 Port Gauge Glasses as used in  
Fittings for Steam Boilers

( Second Revision )

ICS 17.040.30

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## FOREWORD

This Indian Standard (Part 5) (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Chemical Engineering Plants and Related Equipment Sectional Committee had been approved by the Mechanical Engineering Divisional Council.

This standard was first published in 1969 in two parts and then revised in 1985. The present revision has been taken up with a view to incorporate the modification found necessary as a result of experience gained in the use of this standard. Also, in this revision, the standard has been brought into the latest style and format of Indian Standards, and references to Indian Standards, wherever applicable have been updated. BIS certification marking clause has been modified to align with the revised *Bureau of Indian Standards Act, 2016*.

This standard on gauge glass, Part 5 Port gauge glasses as used in fittings for steam boilers is one of the series of standards on gauge glasses. Other parts of this standard are:

- Part 1 Tubular glasses for level gauges
- Part 2 Protector glasses for tubular gauge glasses
- Part 3 Through-vision and reflex glasses
- Part 4 Circular sight and light glasses

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard***GAUGE GLASSES — SPECIFICATION****PART 5 PORT GAUGE GLASSES AS USED IN FITTINGS FOR STEAM BOILERS***( Second Revision )***1 SCOPE**

This standard (Part 5) covers the requirements for port gauge glasses as used in fittings for steam boilers.

**2 REFERENCES**

The standard given below contains provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the edition indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of this standard:

<i>IS No.</i>	<i>Title</i>
IS 5428 (Part 1) : 1985	Specification for gauge glasses: Part 1 Tubular glasses for level gauges ( <i>first revision</i> )

**3 DEFINITIONS**

For the definitions of various terms used in glass industry refer to 2 of IS 5428 (Part 1).

**4 MATERIAL**

**4.1** Port gauge glasses shall be made of toughened borosilicate glass.

**4.2** Port gauge glasses shall be free from defects that could interfere with vision or service.

**4.3** The following properties shall be decided between the purchaser and the manufacturer depending on working conditions and shall be specified along with requisitions:

- Chemical resistance to water, acid and alkalis with some minimum limits;
- Average coefficient of thermal expansion;
- Chemical composition of glass; and
- Tensile and bending strength at ambient and maximum operating temperature.

**5 DIMENSIONS**

**5.1** Port gauge glasses shall be right cylinders within the tolerances specified.

**5.2** The diameters of port gauge glasses shall be as agreed to between the purchaser and the manufacturer, but shall not exceed 52 mm for working gauge pressures up to 8 000 kPa nor 34 mm for working gauge pressures up to 20 600 kPa.

**5.3** The thickness of port gauge glasses shall not be less than:

- 12.0 mm for diameters up to 29 mm;
- 12.6 mm for diameters over 29 mm and up to 32 mm;
- 14.0 mm for diameters over 32 mm and up to 34 mm; and
- 17.0 mm for diameters over 34 mm and up to 52 mm.

**5.4** All sharp edges shall be uniformly bevelled at 45° around the periphery. The width of the bevels is a function of the design of the fitting and shall be the subject of agreement between the purchaser and the manufacturer.

**6 TOLERANCES**

**6.1** Particular design requirements may necessitate manufacture to closer tolerances than those given in **6.2** to **6.4** in which case they shall be subjected to agreement between the purchaser and the manufacturer.

**6.2** The diametral tolerances shall not exceed a total of 0.4 mm for diameters up to 34 mm nor a total of 0.8 mm for diameters over 34 mm and up to 52 mm.

**6.3** The thickness tolerance, subjected to the additional limitations of **6.4**, shall be as follows:

- For applications up to a working gauge pressure of 8 000 kPa, the total tolerance shall not exceed 0.25 mm; and
- For applications above a working gauge pressure of 8 000 kPa and up to 20 600 kPa, the total tolerance shall not exceed 0.10 mm.

**6.4** The parallelism of surfaces shall be assessed by measuring the variation of thickness around the perimeter of a circle having a diameter 3 mm less

than that of the glass. A minimum of 6 measurements shall be taken, variation in thickness in any one glass shall not exceed the following:

- a) For applications up to a working gauge pressure of 8 000 kPa — 0.075 mm; and
- b) For applications above a working gauge pressure of 8 000 kPa and up to 20 600 kPa — 0.025 mm.

## 7 FINISH OF FACES

The faces of port gauge glasses shall be polished; their edges may be smooth ground or as moulded.

## 8 TESTS

### 8.1 Dimension Check

The port gauge glasses shall be checked for conforming to the specified dimensions.

### 8.2 Inspection Under Polarized Light

Each toughened port gauge glass shall be examined under polarized light. Any glass which does not show a polarization pattern indicative of toughening shall be rejected. Hoop stress, as seen by rotation of the glass in the strain viewer, shall not be interrupted by the presence of surface cracks heavy cord or other defects.

### 8.3 Thermal Shock Requirements

The manufacturer shall subject or cause to be subjected, toughened port gauge glasses to thermal shock test as described in 8.4 of IS 5428 (Part 1). Port gauge glasses, being small, shall be supported above the base of the oven while being heated. Individual wire frames, with the glass resting on its edges on two thin wires shall be used. After reaching

the specified temperature, the glass shall be transported in the frame as quickly as possible to the quenching bath, but the glass only shall be dipped into the water. These small glasses may enter the water edges first. The number of glasses so subjected shall be 2 percent of the consignment, but not less than 10 glasses, nor more than 30 glasses, selected at random. A failure of a single glass shall cause the whole of the consignment to be rejected. Glasses subject to and passing the test may be put into service

### 8.4 Hydrostatic Test

The assembly shall be hydro-tested at a minimum pressure of  $1.5 \times \text{operating pressure} \times \text{allowable stress of glass at ambient temperature/allowable stress of glass at operating temperature}$ .

## 9 MARKING

The port gauge glasses shall be permanently marked with the following:

- a) Manufacturer's identification or trade-mark.

### 9.1 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

## 10 PACKING

The glasses shall be packed securely in suitable inner boxes, containing not more than 24 glasses and adequately cased for transit.

**ANNEX A***(Foreword)***COMMITTEE COMPOSITION**

Chemical Engineering Plants and Related Equipment Sectional Committee, MED 17

<i>Organization</i>	<i>Representative(s)</i>
CSIR - Indian Institute of Petroleum, Dehradun	DR MRITUNJAY KUMAR SHUKLA ( <b><i>Chairperson</i></b> )
Advance Valves Global, Noida	SHRI PRANAY S. GARG SHRI CHANDRAKANT WADKAR ( <i>Alternate</i> )
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Blast Carboblocks Private Limited, Mumbai	SHRI DHAWAL SAXENA
Central Power Research Institute, Bengaluru	DR P. THOMAS SHRI SADASIVA MURTHY P. ( <i>Alternate I</i> ) SHRI AJITH KUMAR N. ( <i>Alternate II</i> )
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Confederation of Indian Industry, New Delhi	SHRI DUSHYANT SINGH
Directorate General Factory Advice Service and Labour Institutes, Mumbai	SHRI TANOJ CHANDAN SHRI KUNAL SHARMA ( <i>Alternate</i> )
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GMM Pfaudler Limited, Anand	SHRI DHIRAN PANCHAL SHRI SATVIK PATEL ( <i>Alternate</i> )
Hindustan Petroleum Corporation Limited, Mumbai	SHRI KRISHANU GHOSH SHRI N. K. RAI ( <i>Alternate</i> )
Indian Oil Corporation Limited, New Delhi	SHRI KARAN AGRAWAL
Indian Rubber Manufacturers Research Association, Mumbai	DR K. RAJ KUMAR DR DEBDIPTA BASU ( <i>Alternate</i> )
Indian Valve and Actuator Manufacturers Association (IVAMA), Coimbatore	SHRI R. MURUGANANTHAM SHRI JAY DOSHI ( <i>Alternate</i> )
Kejriwal Casting Limited, Kolkata	SHRI SANDEEP KEJRIWAL
L&T Valves, Chennai	SHRI ROHIT SHARMA SHRI SURIYANARAYANAN ( <i>Alternate</i> )
Lathia Rubber Manufacture Company Private Limited, Mumbai	SHRI SANJIV S. LATHIA
MECON Limited, Ranchi	SHRI YOGENDRA KUMAR SINGH SHRI ARVIND BHUSHAN ( <i>Alternate</i> )

**IS 5428 (Part 5) : 2023**

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Tata Consulting Engineers Limited, Navi Mumbai	SHRI SHIVNARAYAN PAREEK SHRI SHIREESH S. SWAMI ( <i>Alternate</i> )
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*Member Secretary*  
MS NEHA THAKUR  
SCIENTIST 'B'/ASSISTANT DIRECTOR  
(MECHANICAL ENGINEERING), BIS



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This Indian Standard has been developed from Doc No.: MED 17 (19922).

### Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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